Chapter 2 questions

7. Your class sponsors a benefit concert and prices the tickets at $8 each. Kim sells 12 tickets, Andy 16, Pat 13, and Morgan 17. Compute the total revenue brought in by these four persons. Notice that there are two ways to do the calculation.

11. (Continuation) A familiar feature of arithmetic is that *multiplication distributes over addition*. Written in algebraic code, this property looks like $a(b+c) = ab+ac$. Because of this property, there are two equivalent methods that can be used to compute the answer in the previous problem. Explain, using words and complete sentences.

8. Explain why there are two ways to compute each of the following:
(a) $3(2+3+5)$ (b) $\frac{1}{3}(9+6-3)$ (c) $(9+6-3) \div 3$

1. What is the value of $3+(-3)$? What is the value of $(-10.4)+10.4$? These pairs of numbers are called *opposites*. What is the sum of a number and its opposite? Does every number have an opposite? State the opposite of:
(a) -2.341 (b) $1/3$ (c) x (d) $x+2$ (e) $x-2$

3. You are already familiar with operations involving positive numbers, but much mathematical work deals with negative numbers. Common uses include temperatures, money, and games. It is important to understand how these numbers behave in arithmetic calculations. First, consider addition and subtraction. For each of the following, show how the answer can be visualized using a number-line diagram:
(a) The air temperature at 2 pm was $12°$. What was the air temperature at 8 pm, if it had dropped $15°$ by then?
(b) Telescope Peak in the Panamint Mountain Range, which borders Death Valley, is 11045 feet above sea level. At its lowest point, Death Valley is 282 feet below sea level. What is the vertical distance from the bottom of Death Valley to the top of Telescope Peak?
(c) In a recent game, I had a score of 3. I then proceeded to lose 5 points and 7 points on my next two turns. On the turn after that, however, I gained 8 points. What was my score at this moment in the game?

5. The temperature outside is dropping $3°$ per hour. If the temperature at noon was $0°$, what was the temperature at 1 pm? 2 pm? 3 pm? 6 pm? What was the temperature t hours after noon?

6. The distributive property states that $(-1)x + 1x$ is the same as $(-1+1)x$, and this is 0. It follows that $(-1)x$ is the same as $-x$. Explain why, then use similar reasoning to explain why $(-x)y$ is the same as $-(xy)$. By the way, is it correct to say that "$-x$ is a negative number"?

8. The product of two negative numbers is always a positive number. How would you explain this rule to a classmate who does not understand why the product of two negative numbers must be positive?

3. The division problem $12 \div \frac{3}{4}$ is equivalent to the multiplication problem $12 \cdot \frac{4}{3}$. Write each of the following division problems as equivalent multiplication problems:
(a) $20 \div 5$ (b) $20 \div \frac{1}{5}$ (c) $20 \div \frac{2}{5}$ (d) $a \div \frac{b}{c}$ (e) $\frac{b}{c} \div a$

4. What is the value of $\frac{2}{3} \cdot \frac{3}{2}$? What is the value of $4 \cdot \frac{1}{4}$? These pairs of numbers are called *reciprocals*. What is the product of a number and its reciprocal? Does every number have a reciprocal? State the reciprocal of the following:
(a) $\frac{5}{3}$ (b) $-\frac{1}{2}$ (c) 2000 (d) $\frac{a}{b}$ (e) x

6. Use the distributive property to explain why $3x + 2x$ can be simplified to $5x$.

7. (Continuation) Write each of the following as a product of x and another quantity:
(a) $16x + 7x$ (b) $12x - 6x$ (c) $ax + bx$ (d) $px - qx$

2. Simplify the expression $k - 2(k - (2 - k)) - 2$ by writing it without using parentheses.

8. The figure shows some more algebra blocks. The 1-by-1 square is called a *unit block*, or a *1-block*. Below the 1-block is a representation of $x + 2$, formed from an x-block and two 1-blocks. Draw a diagram using the appropriate number of x-blocks and 1-blocks to illustrate the distributive propertry $3(x + 2) = 3x + 6$.